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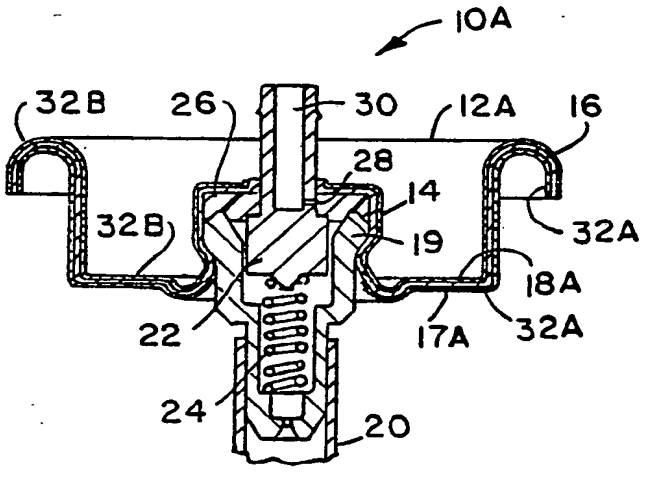

(57) Abstract

An improved aerosol assembly and method of making the same for an aerosol container having a container sealing bead disposed about an upper opening in the aerosol container. The invention includes a mounting cup (12) having a mounting cup sealing rim (16) extending about the periphery thereof. A valve assembly is disposed i n the mounting cup for providing fluid communication between the interior of the aerosol container and the exterior of the aerosol container. A sealing gasket (26) is formed by heating the mounting cup (12) and applying plastic particles (62) to the heated mounting cup (12) for providing a fluid-tight seal when the mounting cup (12) is secured to the aerosol container. The invention also includes the method of applying the plastic particles (62) to the heated mounting cup (12) for providing a sealing gasket and protective coating (32) for the mounting cup (12) with a uniform coating thickness.

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Description

An Improved Mounting Cup and Method of Making Same

Technical Field

This invention relates to fluid sprinkling and more particularly to an apparatus and method of forming a fluid-tight seal between a mounting cup an an aerosol container.

Background Art

The aerosol industry has undergone dramatic and substantial changes since the birth of the industry many decades ago. It has been a constant desire of the aerosol industry to increase the reliability of the aerosol devices while simultaneously reducing the manufacturing and the consumer costs of the aerosol device. Each individual part of the aerosol device has been investigated in an attempt to reduce the part cost as well as the cost of assembly of the aerosol device. The time required to fabricate each individual part as well as the time required to fabricate the device, has been investigated in a continuing attempt to further reduce the cost of aerosol devices. If a single step in the assembly process can be accomplished in a shorter period of time, a substantial reduction in overall cost will be realized by the increase in production.

Among the most time consuming steps in the fabrication of an aerosol valve is the application of a sealing gasket material to the aerosol mounting cup for sealing with the aerosol container. In general, the aerosol mounting cup is fabricated by first stamping a sheet material through a progressive die to form the mounting cup turret with a central through aperture and peripheral sealing rim for sealing with an annular bead disposed on the aerosol container. The stamped mounting cups are oriented for enabling a solvent based gasket material to be poured into the rim of the mounting cup. The solvent based gasket material is allowed to set at room temperature for approximately one hour and is then progressively passed through three curing ovens. The three progressive ovens are typically set at 150°C, 250°C and 350°C. The mounting cup is placed in each oven for approximately one hour in order to remove

the solvent totally from the solvent based coating and gasket material and to leave a solvent residue of rubber to effect the seal between the mounting cup and the aerosol container. The heated mounting cups are allowed to cool to proper handling temperature prior to assembly with the aerosol valve and dip tube. Presently this prior art process requires approximately four and one-half hours of time for each mounting cup to provide a suitable coating for sealing with the aerosol container. However, since the solvent based coating and gasket material is allowed to flow into the mounting cup lip, the resultant solid residue of rubber is irregular in thickness and may result in a defective seal between the mounting cup and the aerosol container.

Others in the prior art used a precoated process wherein the mounting cup stock is unrolled and coated with a gasket material. The sheet stock is punched and formed to create the aerosol valve mounting cup. Since the sheet stock is coated prior to forming, substantial stresses are developed within the coating. In addition, the coating may be damaged during the punching and forming process.

U. S. Patent 3,417,117 illustrates a sealing gasket for an aerosol mounting cup formed by positioning a circular band of heat-shrinkable material over a portion of the skirt of the cup. The mounting cup is then heated to shrink the band of material into frictional contact with the skirt of the mounting cup.

U. S. Patent 3,443,006 pertains to a method of making a gasketed closure element by swelling a band of gasket material and positioning the band of gasket material about the skirt of the mounting cup. The band of gasket material is then allowed to return to a normal condition to be in frictional engagement with the mounting cup skirt.

Others in the prior art have utilized electrostatic spraying of paints on other coatings, but such processes have not been applied to the application of sealing gaskets.

Others in the prior art have utilized the immersion of heated items into a vessel of plastic particles but these patents relate to

protective coatings and do not relate to sealing gaskets and the like.

Although many in the prior art have attempted various methods to reduce the time required to apply a gasket material to an aerosol mounting cup, the prior art has heretofore failed to provide an inexpensive and reliable method which is a suitable replacement to the solvent based coating and gasket material which is presently universally used in the aerosol industry.

Therefore, it is an object of this invention to provide an apparatus which overcomes the aforementioned difficulties of the prior art devices and provides an improvement which is a significant contribution to the advancement of the aerosol art.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup incorporating the deposition of a uniform thickness of plastic sheet material on a sealing surface which may be readily cured into a resilient sealing material to provide a fluid-tight seal between the mounting cup and the aerosol container.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup incorporating the deposition of a coating of plastic material on the entire interior and exterior surface of the mounting cup.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup wherein the time required to cure the deposited resilient material is substantially less than the time required to liberate the solvent of a solvent-based gasket material of the prior art.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup wherein plastic particles are applied to a heated mounting cup to provide a uniform coating on the exterior surface of the mounting cup.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup wherein a resilient gasket material is deposited on the entire internal area of the mounting cup for providing a fluid-tight seal between the mounting

cup and the aerosol container as well as protecting the mounting cup from the product internal the aerosol container.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup which may be colored to provide an integral color code for the mounting cup.

Another object of this invention is to provide an improved seal between an aerosol container and a mounting cup which substantially reduces the cost of fabrication of aerosol assemblies.

Another object of this invention is to provide a method of fabricating an aerosol valve and mounting cup through the application of minute plastic particles to a heated mounting cup with an application of heat to cure the plastic coating prior to receiving the aerosol valve within the mounting cup.

Another object of this invention is to provide a method for applying a sealing gasket material to a sealing surface between a mounting cup and an aerosol container incorporating a plastic material on the sealing surface and the application of heat to cure the plastic material into an integral resilient coating.

The foregoing has outlined some of the more pertinent objects of the invention. These objects should be construed to be merely illustrative of some of the more prominent features and applications of the intended invention. Many other beneficial results can be attained by applying the disclosed invention in a different manner or modifying the invention within the scope of the disclosure. Accordingly, other objects and a fuller understanding of the invention may be had by referring to the summary of the invention and the detailed description describing the preferred embodiment in addition to the scope of the invention defined by the claims taken in conjunction with the accompanying drawings.

Disclosure of the Invention

The invention is defined by the appended claims with a specific embodiment shown in the attached drawings. For the purpose of summarizing the invention, the invention may be incorporated into an improved aerosol assembly for an aerosol container having container sealing means disposed about an upper

opening in the aerosol container. The invention comprises a mounting cup having a mounting cup rim extending about the periphery thereof. A valve assembly is disposed in the mounting cup for providing fluid communication between the interior of the aerosol container and the exterior of the aerosol container. A sealing gasket is disposed on said mounting cup formed by heating the mounting cup and applying plastic particles to the heated mounting cup for providing a fluid-tight seal when the mounting cup is secured to the aerosol container.

In a more specific embodiment of the invention, the aerosol container includes a container sealing bead disposed about the periphery of an opening in the aerosol container. A rim is disposed about the periphery of the mounting cup for cooperation with the bead of the aerosol container. The sealing gasket is formed by fusing plastic particles to the heated mounting cup to provide a continuous plastic coating upon the entire interior and exterior surface of the mounting cup for providing a seal between the mounting cup and the aerosol container and for protecting the interior and exterior surface of the mounting cup. The coating provides a uniform coating on the mounting cup rim and may be colored to provide an integral color code for the mounting cup.

The invention also comprises the method of fabricating an aerosol valve and mounting cup assembly and the method of fabricating an aerosol device comprising the steps of stamping the mounting cup from a metallic sheet material. The method includes the step of heating the mounting cup and applying plastic particles to the heated mounting cup to form a sealing gasket and a protective coating. The heating of the mounting cup may be accomplished prior to or concomitantly with the application of plastic particles. Heat may also be applied to the mounting cup after application of the plastic particles to fuse the plastic particles to the mounting cup. The mounting cup is cooled and the aerosol valve is then secured to the coated mounting cup. The aerosol dispenser is further fabricated in the conventional manner.

The invention may also be incorporated into an apparatus and method of coating mounting cups incorporating a non-metallic vessel for receiving plastic particulate material therein. The mounting cups are introduced into the vessel and are moved within the plastic particulate material. An induction heater is disposed adjacent the non-metallic vessel for heating the mounting cups when the mounting cups are immersed in the plastic particulate material to form a continuous plastic coating thereon. The coated mounting cups are then discharged from the vessel and are fused by either induction heating or conventional convection heating.

The foregoing has outlined rather broadly the more pertinent and important features of the present invention in order that the detailed description of the invention that follows may be better understood so that the present contribution to the art can be more fully appreciated. Additional features of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and the specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims.

Brief Description of the Drawings

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings in which:

Fig. 1 is a side sectional view of a conventional mounting cup and aerosol valve assembly;

Fig. 2 is a partial side sectional view showing the fluid-tight seal between a conventional aerosol valve assembly and an aerosol container;

Fig. 3 is a side sectional view of a mounting cup and aerosol valve assembly in accordance with the present invention;

Fig. 4 is a partial side sectional view showing the fluid-tight seal between the mounting cup of Fig. 3 and an aerosol container;

Fig. 5 illustrates a prior art process for fabricating the mounting cup shown in Fig. 1;

Fig. 6 illustrates the improved method of forming the mounting cups as shown in Fig. 3 in accordance with the present invention;

Fig. 7 illustrates a section of a ribbon of mounting cups in the process shown in Fig. 6;

Fig. 8 is a second improved method of forming the mounting cup shown in Fig. 3;

Fig. 9 is a plan view illustrating the geometry of the vibratory bowl shown in Fig. 8;

Fig. 9A is a sectional view along lines 9A-9A in Fig. 9;

Fig. 10 is a third improved method of forming the mounting cup shown in Fig. 3;

Fig. 11 is an enlarged detailed view of the novel process and apparatus of Fig. 10;

Fig. 12 is a sectional view along line 12-12 of Fig. 11;

Fig. 13 is an enlarged sectional view along line 13-13 of Fig. 11;

Fig. 14 is a sectional view along line 14-14 of Fig. 11;

Fig. 15 is a side sectional view showing a coating utilizing a small particle size powder; and

Fig. 16 is a side sectional view showing a coating utilizing a larger particle size powder.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Best Mode for Carrying Out the Invention

Fig. 1 illustrates a side sectional view of a prior art aerosol mounting cup and valve assembly 10 which should be well known to those skilled in the art. The assembly comprises a mounting cup 12 having a central turret 14 and a mounting rim 16 extending about the outer periphery thereof. The turret 14 receives an aerosol valve assembly which may be of various designs to operate between an interior surface 17 and an exterior surface 18. In this

embodiment, a valve body 19 communicates with the interior of the aerosol container through a dip tube 20. A valve stem 22 is biased by a spring 24 into sealing engagement with a sealing gasket 26 for controlling the flow of product and propellant through a metering orifice 28 communicating to a valve stem aperture 30.

The mounting rim 16 is provided with a sealing gasket 32 which is generally a solvent-based rubber material which forms a seal with a bead 34 of an aerosol container 36 as shown more fully in Fig. 2. Typically, the mounting cup rim 16 is inserted on the aerosol container bead 34 with a region 38 of the mounting cup rim being deformed to form a fluid-tight seal through the coating 32 on the mounting cup rim 16.

Fig. 3 illustrates a mounting cup and aerosol valve assembly 10A in accordance with the present invention. Under the practice of this invention the sealing gasket and coating 32A extends along the entire interior surface 17A of the mounting cup in addition to the coating 32B extending along the entire exterior surface 18A.

Fig. 4 illustrates the mounting cup 12A of Fig. 3 forming a seal with the sealing bead 34 of aerosol container 36 through deformed region 38A in a conventional manner as shown in Fig. 2.

Fig. 5 illustrates the steps in the formation of the mounting cup 12 shown in Fig. 1 under a prior art practice. A ribbon of roll stock 41 disposed on a drum 42 is passed through a series of progressive dies 44 to form the contour of the mounting cup 12 shown in Fig. 1. The formed mounting cups 12 are severed from one another and passed through an orienter 46 which orients the mounting cups 12 such that the interior surface 17 is face up, enabling an applicator 48 to apply a solvent-based coating and gasket material 32 to flow into the mounting cup rim 16. After the initial coating of gasket material 32, the mounting cups 12 are allowed to remain at an ambient temperature station 50 for a period of approximately one hour. The mounting cups are passed through progressive ovens 51, 52 and 53 which respectively have temperatures of approximately 150°C, 250°C and 350°C. The mounting cups 12 remain in each individual oven 51-53 for a period

of one hour prior to being removed and cooled in position 54. After cooling, the mounting cups may be fabricated in a conventional manner as should be well known to those skilled in the art.

Fig. 6 illustrates the steps in the formation of the mounting cup 12A shown in Fig. 3 under the present invention. In a similar manner, the ribbon of roll stock 41 is disposed on a drum 42 to be passed through a series of progressive dies 44A to form the contour of the mounting cups 12A shown in Fig. 3. In this embodiment, the progressive dies 44A form the contour of the mounting cups 12A but do not sever the mounting cups 12A from one another as shown in Fig. 7. The mounting cups 12A are held together by tabs 12B in a ribbon 55 eliminating the need for the orienter 46 of Fig. 5.

The ribbon 55 of formed mounting cups 12A is carried by rollers 56 and 58 through an oven 60 to heat the mounting cup to a temperature sufficient to melt a selected plastic particulate material. The selected plastic material 62 is disposed in a vessel 64 having an input 66 and an output 68.

The plastic material is preferably finely ground powder of virtually any fusible plastic material capable of forming the desired seal and being able to associate with the product and propellant within the aerosol container.

Rollers 58 and 70 move the heated mounting cups 12A on ribbon 55 through vessel 64 enabling the plastic particles 62 to fuse to the internal and external surfaces 17A and 18A. The temperature of oven 60, the speed of ribbon 55 and the distance between the input 66 and output 68 of vessel 64 must be interrelated to produce a proper coating to the mounting cups 12A. The process is also dependent on the type of plastic selected and the particle size of the plastic powder. However, one skilled in the art could readily adjust these conditions to provide a proper coating for the specific use of the invention.

The ribbon 55 of mounting cups 12A exit vessel 64 through output 68 and are carried by rollers 70 and 72 through a fusing oven 74. The fusing oven 74, which may be optional in some

applications, creates a unitary coating on the interior and exterior surfaces 17A and 18A of the mounting cups 12A. The mounting cup ribbons 55 are then severed from one another by a cutter 76 which cuts tabs 12B. The individual mounting cups 12A are ejected from cutter 76 for subsequent assembly with the valve mechanism.

Fig. 8 is a second method of forming the mounting cup 12A shown in Fig. 3. In this embodiment, a ribbon of roll stock 41 disposed on a drum 42 is passed through a series of progressive dies 44A to form the contour of mounting cup 12A shown in Fig. 3. The formed mounting cups 12A are severed from one another and passed through an oven 80 on a conveyor 82 driven by rollers 84 and 86. The oven 80 is sufficient to heat the mounting cups to a temperature to melt a preselected plastic material. The heated mounting cups are carried by a conveyor 88 driven between rollers 86 and 90 to a vibratory bowl 92 driven by a motor 94 shown more particularly in Fig. 9. The vibratory bowl 92 has a central portion 95 for receiving the mounting cups 12A. A channel 96 is defined between side walls 98 and 100 enabling the mounting cups 12A to move along the path to an exit 102 along channel 96. The channel 96 is arranged such that the mounting cups are preferably disposed at an acute angle, namely that neither the internal or external surfaces 17A or 18A are disposed facing a vertical direction as shown in Fig. 9A. The inclined position of the mounting cups 12A eliminates the formation of bubbles adjacent the interior and exterior surfaces 17A and 18A which will cause a defective coating. Accordingly, the mounting cups 12A essentially roll as inclined wheels along channel 96. The interior of the vibratory bowl 92 includes plastic particles 62 enabling a substantially uniform coating to be provided to the interior and exterior 17A and 18A of the mounting cup 12A.

The coated mounting cups emanating from output 102 are passed to a conveyor 104 driven by rollers 106 and 108 through a fusing oven 110 which completes the fusing process of the coating on the mounting cups 12A. The function of the vibratory bowl 92 should be well known to those skilled in the art.

Fig. 10 illustrates the steps of forming the mounting cup 12A shown in Fig. 3 under a third method and apparatus. A ribbon of roll stock 41 disposed on a drum 42 is passed through a series of progressive dies 44 to form the contour of the mounting cup 12A shown in Fig. 3. The formed mounting cups 12A are severed from one another and passed through an orienter 46 which orients the mounting cups 12A into a preferred orientation. The oriented mounting cups 12A are discharged from orienter 46 into an input 120 of a vessel 122. The vessel 122 is a non-metallic vessel containing plastic particulate material 62. The mounting cups 12A pass along a channel 124 and are totally immersed within the plastic particulate material 62. An induction heating coil 126 is connected to an induction heating generator 128 shown in Fig. 11 to induce eddy currents within the metallic mounting cups 12A to heat the mounting cups while the mounting cups are immersed within the plastic particulate material 62. The heated mounting cups 12A melt the plastic particulate material 62 adjacent the metallic surfaces thereof and are coated to form a uniform resilient plastic coating to form a protective coating and a sealing gasket as shown in Figs. 3 and 4. The coated mounting cups 12A are expelled from the vessel 122 by a discharge means 130 and are placed on a conveyor 132 driven by rollers 134 and 136. The conveyor 132 is preferably non-metallic and made of a material which will inhibit the adhesion of the plastic particulate material 62 coated on the mounting cups 12A. The coated mounting cups 12A are passed through a second induction heating coil 138 connected to an induction generator 140 shown in Fig. 11 to induce eddy currents within the mounting cups 12A and thus fuse the plastic particulate material adhering to the mounting cups into a uniform resilient plastic coating which is suitable for forming a resilient sealing gasket and a protective coating. The mounting cups 12A are then discharged from conveyor 132.

Fig. 11 illustrates a specific example of the vessel 122 shown in Fig. 10 with a specific means for moving the mounting cups 12A through the vessel 122. The apparatus includes a frame 142 and a

linear vibrator 144 for supporting the vessel 122 through support arms 145. The linear vibrator 144 causes movement of the mounting cups 12A from left to right in Fig. 11. The vessel 122 contains the plastic particulate material 62 and includes a flexible coupling 146 connected by conduit 147 to a pump 148. The pump 148, which may be of various types such as augers, impellers or other pumps suitable for pumping plastic particulate material, forces the plastic particulate material through conduit 149 terminating in orifice 150 adjacent an input support surface 152. The flow of particulate material 62 by pump 148 as illustrated by the arrows within the conduits 147 and 149 as well as the linear motion due to linear vibrator 144 insures a linear progression of the mounting cups 12A from left to right in Fig. 11. This embodiment illustrates a particular method and apparatus for moving the mounting cups 12A through vessel 122 but it should be understood that numerous other means and methods may be incorporated into moving the mounting cups through a non-metallic vessel in combination with induction heating.

The apparatus illustrates input means 120 providing mounting cups 12A to the vessel 122. The plastic particulate material 62 is discharged from orifice 174 onto a support surface 152 and passed over an edge 154. The free-falling plastic particulate material 62 is aerated by the free-fall from input surface 152. The mounting cups 12A are introduced into the stream of aerated plastic particulate material by input means 120 at 121. The kinetic energy developed by the falling mounting cups 12A is of a sufficient level to insure that each mounting cup is completely immersed within the aerated plastic particulate material 62 prior to induction heating. The mounting cups 12A move towards the right through induction heating coil 126 as was heretofore explained.

Fig. 12 illustrates a sectional view along line 12-12 showing the mounting cup 12A within a channel 124 formed by vessel 122 and within the induction heating coil 126. It has been found that when a mounting cup is completely immersed within the plastic particulate material 62, that the mounting cup will, in many instances, maintain

the given attitude such as the vertical attitude along the channel 124 in vessel 122.

The coated mounting cups 12A move toward the discharge means 130 shown more specifically in Fig. 13. The discharge means, which is secured to vessel 122 to vibrate therewith includes support members 160 and 162 for supporting porous means 164, such as a screen, enabling the mounting cup 12A to discharge the unmelted plastic particulate material 165 on the exterior surface 18A of the mounting cup in Fig. 13 into the vessel 122 under vibration of the linear vibrator 144. Concomitantly therewith, a vacuum head 166 connected by pipe 168 to a partial vacuum 170 removes any unmelted particulate material 171 from the interior surface 17A of the mounting cup 12A. Unmelted plastic particulate material is similarly removed from the interior and exterior surface 17A and 18A in the event the mounting cup 12A is inverted with respect to Fig. 13. The plastic particulate material removed by the vacuum head 166 is discharged through a conduit 172 to be recycled proximate the input support surface 152 by discharge orifice 174.

The vibratory motion of the linear vibrator 144 enables the mounting cups 12A to move up the discharge means 130 to conveyor 132. The conveyor 132 receives the coated mounting cups 12A enabling the induction heating coil 138 to fuse the plastic particulate material 62 into a resilient continuous uniform sealing gasket and protective coating. Fig. 14 illustrates a sectional view along line 14-14 illustrating the conveyor 132, the mounting cup 12A within the induction heating coil 138.

It has been found that a high temperature of approximately 600°F. is required to properly melt a suitable plastic particulate material such as polyethylene within the vessel 122 for a sealing gasket and protective coating. In cases where tin coated steel is used for mounting cups, it has been found that mounting cups disposed in an oven at 600°F. for more than three minutes experience discoloration due to the melting of the tin coating. However, tin coated mounting cups can withstand a heating of 600°F for less than three minutes without discoloration. Accordingly, the

present invention enables the very rapid heating of the mounting cups for proper coating without the discoloration of any tin coating on the mounting cup. For example, in the process shown in Figs. 6 and 8, using a polyethylene plastic material, mounting cups 12A are subjected to a temperature of approximately 600°F for a period of one minute in ovens 60 or 80. Typically the coating process requires less than twenty seconds. The mounting cups 12A may then be fused in ovens 74 or 110 at a temperature of approximately 600°F for a period of less than one minute. In the embodiment shown in Figs. 10-14, the mounting cups 12A are typically heated to the required temperature in a matter of approximately three seconds with the total coating operation taking less than twenty seconds. Fusing by induction coil 138 normally requires less than three seconds. It should be understood that the above parameters are by way of example only and should not be construed to be a limitation on the present invention.

Preferably, the mounting cups are rapidly heated to approximately 600°F with the induction heating coil for providing the adherence of the plastic particulate material to the mounting cup. The power required by the induction generator is, in part, determined by the geometry of the induction heating coil as well as the type of plastic particulate material, the particle size of the plastic particulate material, and the speed at which the mounting cups 12A are passed through the induction heating coil. It should be appreciated by those skilled in the art that these parameters may be varied depending on the particular application.

Fig. 10 also illustrates an optional step of rapidly cooling the mounting cups 12A after discharge from conveyor 132. In this embodiment, the rapid cooling means is illustrated by a fluid bath including a fluid 180 shown as a liquid within a container 182 for rapidly cooling the mounting cups after proper fusion of the uniform protective coating and resilient sealing gasket by induction heating coil 138. The cooling bath further inhibits the discoloration of the mounting cup by rapidly reducing the temperature of the mounting cup after fusion of the plastic coating. It should be

appreciated that the rapid cooling means shown as a liquid bath may be substituted by various cooling means and may be incorporated into all of the embodiments shown in the present application.

The method and apparatus heretofore described may be utilized with various types of plastic material which are capable of fusion to a metallic surface. Plastic material such as polyethylene, polypropylene, vinyl, nylon, acetate or other plastic materials may be utilized with this invention. It has been found that the most satisfactory material for use with the present invention is plastic material which is cryogenically ground to be within 4-7 microns in particle size as depicted by Fig. 15.

Fig. 15 illustrates a surface 12A of the mounting cup with a plurality of particles of plastic material 32A disposed thereon. The particles size of the individual particles 62 enables a close spacing and a uniform coating thickness as shown in Fig. 15.

Fig. 16 illustrates a similar embodiment of a portion of mounting cup 12A with a coating 32C of particles 62C of larger particle size. Voids 112 within the coating surface are experienced by plastic particles having a larger particle size.

The prior art mounting cups typically use a precoated steel having a one-half pound of tin plate to 100 pounds of steel. With the use of the invention set forth herein, reduced tin plate or black plate steel may be utilized in lieu of normally used tin plated steel, resulting in a substantial savings in material costs.

The present disclosure includes that contained in the appended claims as well as that of the foregoing description. Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. An improved aerosol assembly for an aerosol container having a container sealing bead disposed about an upper opening in the aerosol container, comprising in combination:

a mounting cup having mounting cup rim extending about the periphery thereof;

a valve assembly disposed in said mounting cup for providing fluid communication between the interior of the aerosol container and the exterior of the aerosol container; and

a sealing gasket disposed on said mounting cup formed by heating said mounting cup and applying plastic particles to said heated mounting cup for providing a fluid-tight seal when said mounting cup rim is secured to the aerosol container.

2. An improved aerosol assembly as set forth in claim 1, wherein said sealing gasket is formed by fusing said plastic particles to said heated mounting cup to provide a continuous plastic coating thereon.

3. An improved aerosol assembly as set forth in claim 1, wherein the aerosol container includes a container bead disposed about the periphery of an opening in the aerosol container;

said mounting cup including a rim disposed about the periphery thereof for cooperation with the container bead; and

said sealing gasket being fused to the interior of said rim for sealing engagement with the bead of the aerosol container.

4. An improved aerosol assembly as set forth in claim 1, wherein said sealing gasket is fused to the entire interior and exterior surface of said mounting cup for providing a seal between said mounting cup and the aerosol container and for protecting the interior and exterior surfaces of the mounting cup.

5. An improved aerosol assembly as set forth in claim 1, wherein said sealing gasket is colored to provide an integral color code for said mounting cup.

6. An improved aerosol assembly for an aerosol container having a container bead disposed about the periphery of an opening in the aerosol container, comprising in combination:

a mounting cup having a rim disposed about the periphery thereof for cooperation with the container bead disposed about the periphery of the opening in the aerosol container;

a valve assembly disposed in said mounting cup for providing fluid communication between the interior of the aerosol container and the exterior of the aerosol container;

a resilient plastic material fused to said mounting cup rim to provide a resilient sealing gasket when said mounting cup is secured to the aerosol container; and

said resilient plastic coating formed by heating said mounting cup and immersing said heated mounting cup in a vessel of plastic particles to form a continuous plastic coating thereon.

7. An improved aerosol assembly as set forth in claim 6, wherein said resilient plastic material is colored to provide an integral color code for said mounting cup.

8. An improved aerosol assembly as set forth in claim 6, wherein said resilient plastic material is applied to the entire surface of said mounting cup and said plastic material being subsequently fused to the mounting cup by the application of heat.

9. The method of fabricating an aerosol valve and mounting cup assembly for an aerosol container, comprising the steps of:

stamping the mounting cup from a metallic sheet material;

heating the mounting cup to a temperature sufficient to melt the plastic particles of a selected plastic material;

applying plastic particles of the selected plastic material to the heated mounting cup to form a continuous coating thereon;

cooling the coated mounting cup; and

securing the aerosol valve to the coated mounting cup.

10. The method of fabricating an aerosol valve and mounting cup assemblies for aerosol containers, comprising the steps of:

stamping mounting cups from a metallic sheet material;

heating the mounting cup to a temperature sufficient to melt the plastic particles of a selected plastic material;

immersing the heated mounting cups in a vessel containing plastic particles of the selected plastic material to form a continuous coating on the mounting cup;

heating the mounting cups to cure the plastic coatings;

cooling the coated mounting cups; and

securing the aerosol valves to the coated mounting cups.

11. The method as set forth in claim 10, wherein the step of immersing the heated mounting cup in a vessel includes orientating the mounting cup in a preferred orientation with the mounting cup being disposed at an angular relationship relative to the vertical.

12. The method as set forth in claim 10, wherein the step of immersing said heated mounting cup in a vessel includes immersing said heated mounting cup in a vibratory bowl; and

vibrating the vibratory bowl for moving the heated mounting cup therethrough and for dispersing the plastic particles into contact with the heated mounting cup.

13. The method as set forth in claim 10, wherein the step of immersing the heated mounting cup in a vessel includes orientating the mounting cup in an inclined relationship relative to the vertical.

14. The method of fabricating an aerosol fluid sprinkling device, comprising the steps of:

constructing an aerosol container;

stamping a mounting cup from a metallic sheet material;

heating the mounting cup to a temperature sufficient to melt a preselected plastic material;

immersing the heated mounting cup in a vessel containing plastic particles to form a continuous coating on the mounting cup;

securing an aerosol valve to the mounting cup;

filling the aerosol container with an aerosol product;

securing the mounting cup to the aerosol container to form a seal therebetween with the resilient plastic material; and

pressurizing the aerosol container.

15. The method of fabricating an aerosol valve and mounting cup assembly for aerosol containers, comprising the steps of:

stamping a mounting cup from a metallic sheet material;

immersing the mounting cup in a vessel containing plastic particles of a selected plastic material;

heating the mounting cup within the vessel to a temperature sufficient to melt the plastic particles adjacent the mounting cup to form a continuous plastic coating thereon;

removing the plastic coated mounting cup from the vessel;

heating the coated mounting cup to fuse the plastic coating to the mounting cup; and

securing the aerosol valve to the mounting cup.

16. The method as set forth in claim 15, wherein the step of heating the mounting cup within the vessel includes heating the mounting cup by induction heating.

17. The method as set forth in claim 15, wherein the step of removing the mounting cup from the vessel includes removing unmelted plastic particles from the mounting cup.

18. The method as set forth in claim 17 wherein the step of removing the unmelted plastic particles from the mounting cup includes vacuuming the plastic coated mounting cup.

19. The method as set forth in claim 15 including the step of moving the mounting cup through the vessel containing plastic particles by vibrating the vessel.

20. An apparatus for coating mounting cups of an aerosol valve assembly, comprising:

a non-metallic vessel for receiving plastic particulate material;

means for introducing the mounting cup into said non-metallic vessel;

means for moving the mounting cup in said vessel;

induction heating means disposed adjacent said non-metallic vessel for heating the mounting cup when the mounting cup is immersed in the plastic particulate material in said vessel to melt the plastic particulate material adjacent the mounting cup to form a continuous plastic coating thereon; and

discharge means for discharging the coated mounting cup from said vessel.

21. An apparatus as set forth in claim 20, wherein said means for introducing the mounting cup into said non-metallic vessel includes means for imparting kinetic energy to said mounting cup sufficient to be immersed in the plastic particulate material in said vessel.

22. An apparatus as set forth in claim 21, wherein said means for imparting kinetic energy to said mounting cup includes input support means disposed above said vessel for imparting kinetic energy to the mounting cup by action of gravity as the mounting cup falls off of said input support means into said vessel.

23. An apparatus as set forth in claim 20, wherein said means for moving the mounting cup in said vessel includes vibrating means for vibrating said vessel to move the mounting cups in a preselected direction.

24. An apparatus as set forth in claim 20, wherein said means for discharging the coated mounting cup includes means for removing the unmelted plastic particulate material from the mounting cup.

25. An apparatus as set forth in claim 20, wherein said means for discharging the coated mounting cup includes a discharge surface;

said discharge surface having porous means enabling unmelted plastic particulate material to fall from the mounting cup through said porous means; and

vacuum means disposed above said discharge surface to remove unmelted plastic particulate material from the upper portion of the mounting cup.

26. An apparatus as set forth in claim 20, including means for circulating plastic particulate material within said vessel.

27. An apparatus as set forth in claim 20, including means for fusing the coated mounting cups to provide a uniform protective coating and sealing gasket.

28. An apparatus as set forth in claim 27, including coolingmeans for cooling the coated mounting cups upon discharge from said fusing means.

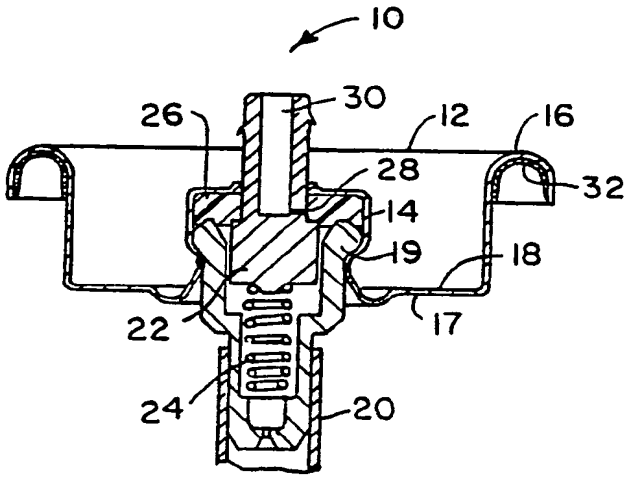

FIG. 1

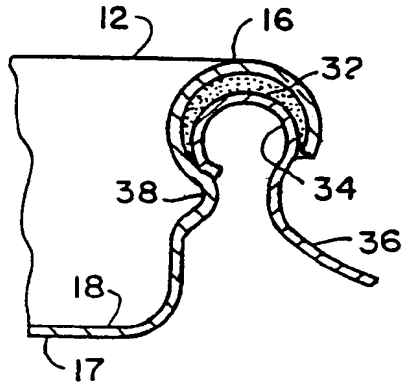

FIG. 2

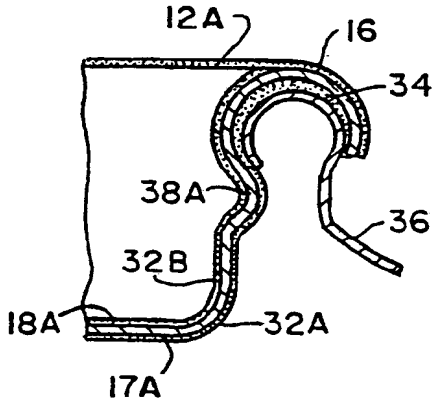

FIG. 4

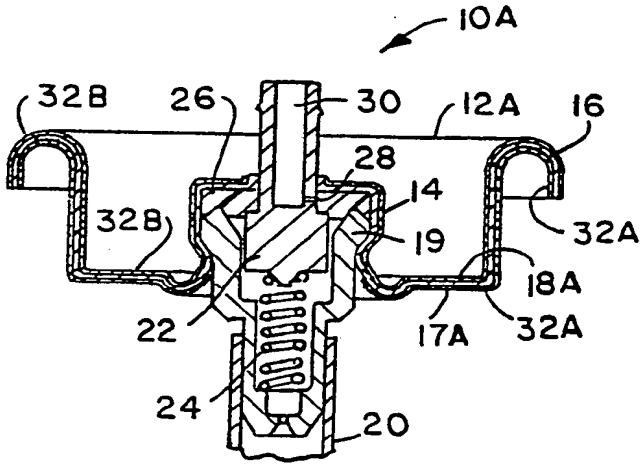

FIG. 3

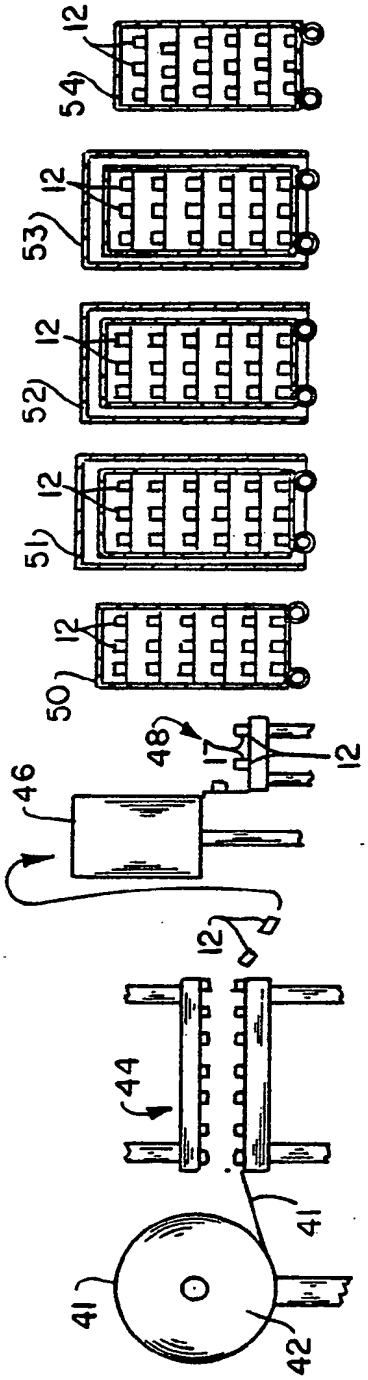

FIG. 5

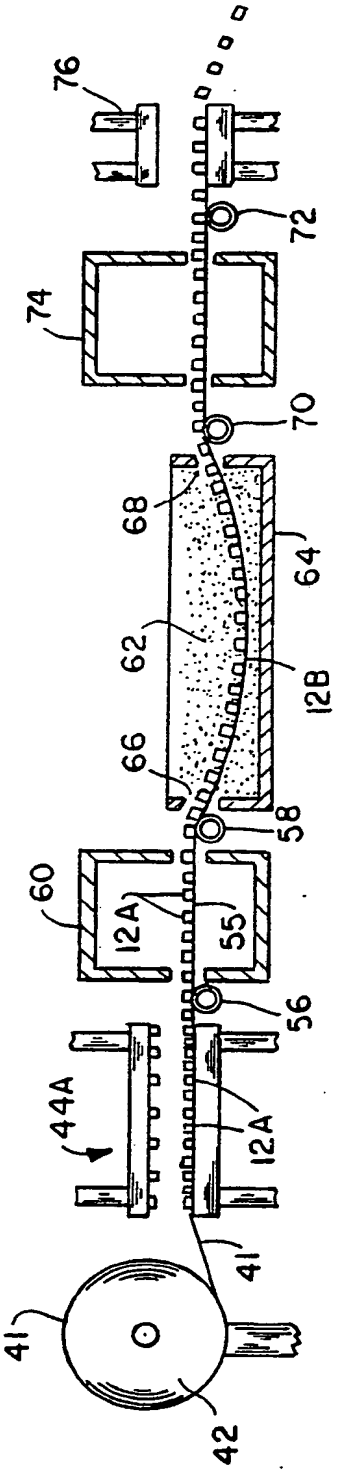

FIG. 6

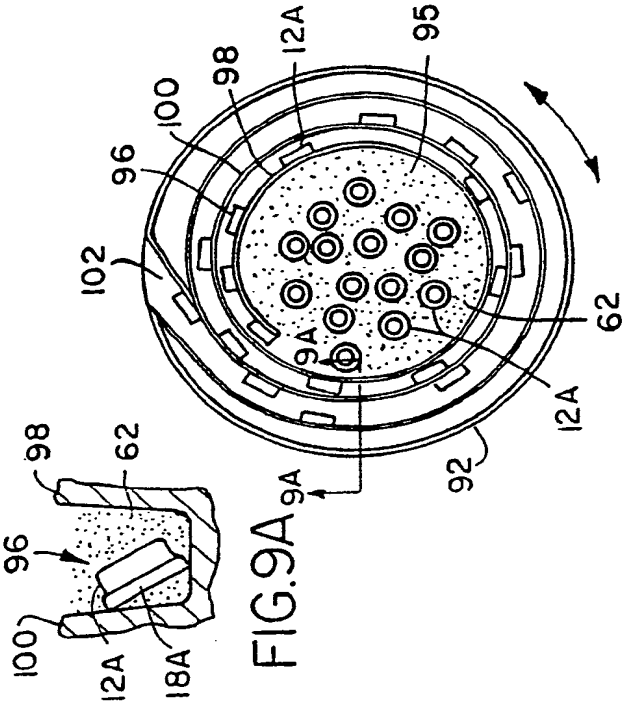

FIG. 9

FIG. 9A

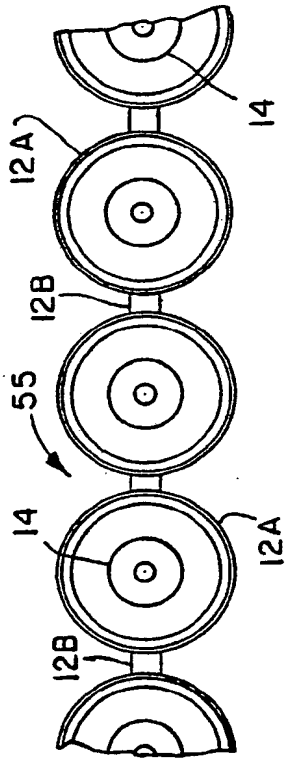

FIG. 7

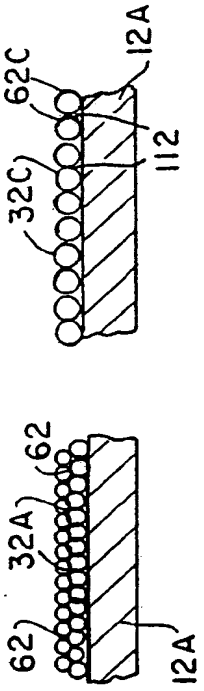

FIG. 16

FIG. 15

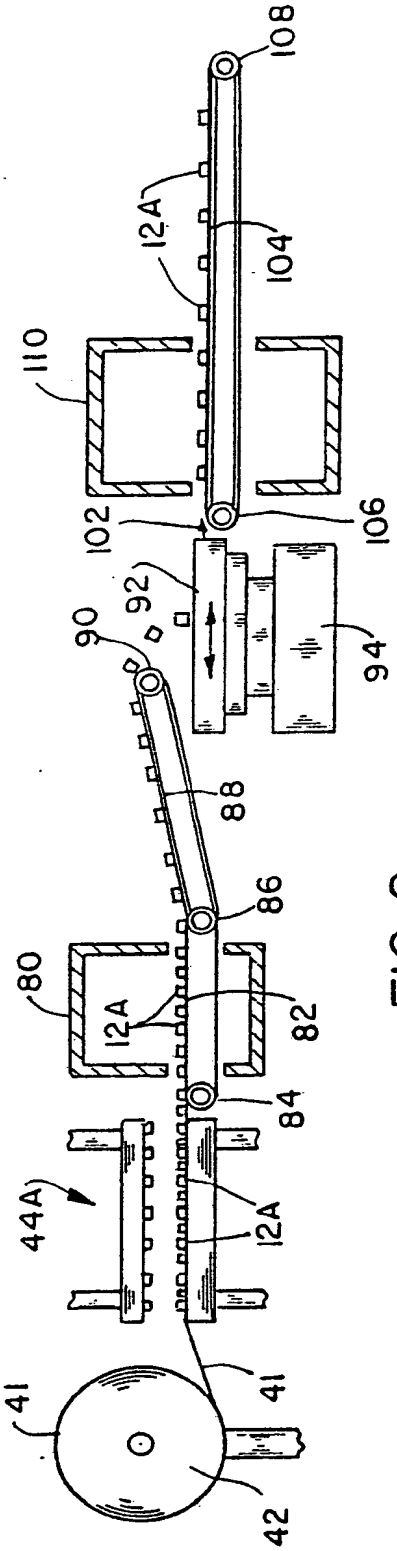

FIG. 8

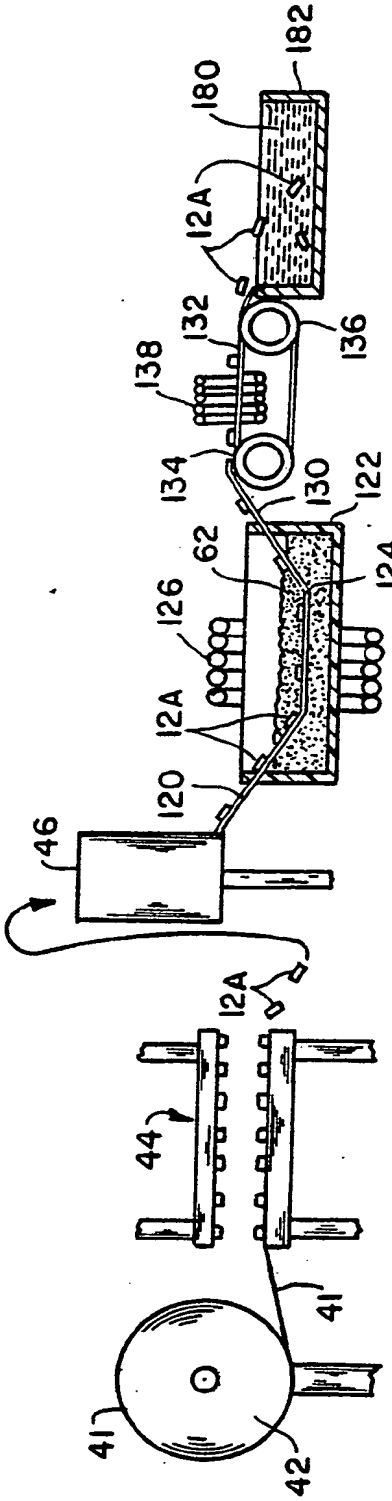

FIG. 10

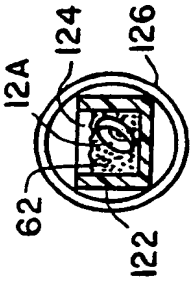

FIG. 12

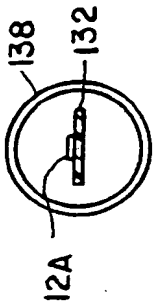

FIG. 14

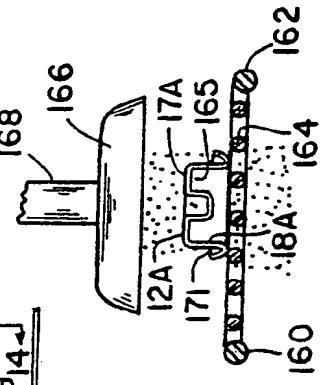

FIG. 13

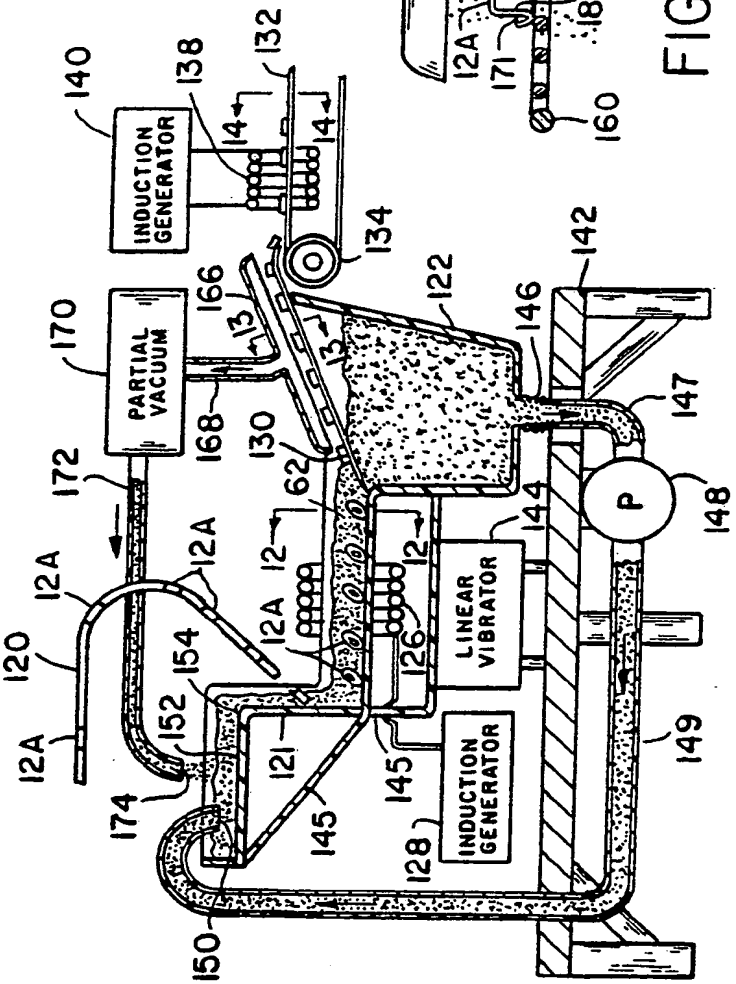

FIG. 11

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No PCT/US83/01463

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL.[3] B65D 83/14, 90/04; B05D 1/24, 3/02
U.S. CL. 222/402.1 427/195 118/620

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U.S.	222/95,394,402.1,402.21-402.25. 156/69,212-213,285. 427/185,27,195,435. 264/510,516,249. 277/205,206A. 413/7,18-20,58-61. 220/454-455,457-458,461. 29/527.4,469.5

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [6]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	US, A, 4,000,338, (Burdin), 28 December 1976.	1-17,19, 23-25.
Y	US, A 3,512,685, (Ewald), 19 May 1970.	1-19.
Y	US, A, 2,047,076, (Kronquest), 07 July 1936.	4
Y	US, A, 4,183,974, (Coucher), 15 January 1980.	8,10.
Y	US, A, 2,676,899, (Hackley), 27 April 1954.	11,13.
Y	US, A, 3,503,778, (Corbett et al), 31 March 1970.	8,10,17-18, 24-25.
Y	US, A, 3,864,798, (Utner), 11 Febru ary 1975.	15-16,20.
Y	GB, A, 1,163,041, (Knapsack), 04 September 1969.	21-22.
Y	DE, A, 2,539,880, (Siemens), 03 October 1977.	15-16,20,26.
Y	US, A, 3,197,324, (Brooks), 27 July 1965.	27-28.

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
14 December 1983	19 DEC 1983
International Searching Authority [1]	**Signature of Authorized Officer [20]**
ISA/US	C.A. Marmor 12/14/83 C.A. Marmor

Form PCT/ISA/210 (second sheet) (October 1981)